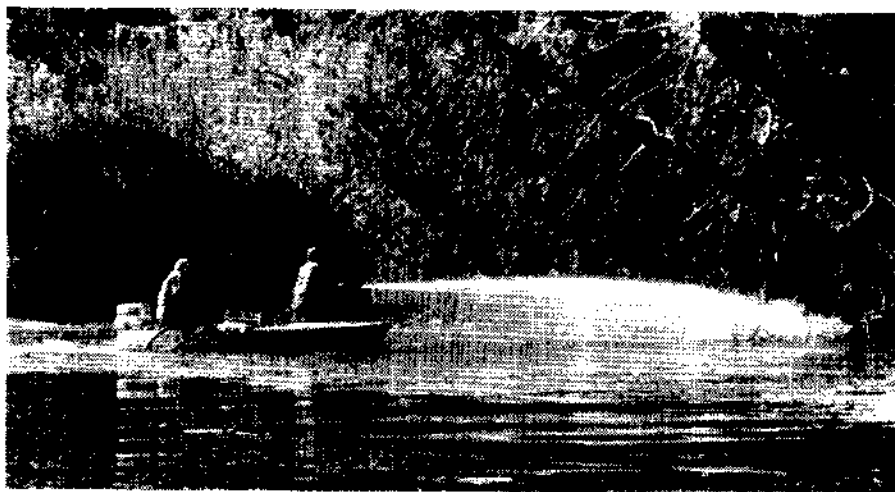


# **\*\*ATTENTION\*\***

*This document is provided for historical purposes only.*

*Documents contained in the Washington Department of Fish and Wildlife Document & Publication Archive may contain dated and/or incorrect information. The WDFW Document & Publication Archive is provided as a service to those interested in the history of fish and wildlife management in Washington State.*



## LAKE REHABILITATION

The sun's last rays shed just enough light for the frustrated fisherman to load his boat, fishing gear and exhausted son and daughter into the car. It had not been a productive day for the three anglers; small sunfish and perch were the only catch. "I just don't understand it" the father whispered to himself. "Five or six years ago, nice fat trout were easy to catch here. I wonder what has happened?"

Each year, Washington Department of Wildlife (WDW) fisheries biologists and agents encounter similar scenes and confused fishermen. In spite of protective regulations and strong enforcement efforts to protect trout waters from inadvertent or intentional introductions of non-trout species, this scene occasionally takes place. What was once an excellent trout lake is now producing few fish.

### WHY

Lakes vary in fertility, and their fertility governs how many pounds of fish they can produce. Those lakes with only trout and those mixed-species lakes with a proper balance of predator and prey species produce the best-quality fishing. But those lakes where the balance is tipped in favor of undesirable fish soon lose their ability to sustain a quality fishing experience.

Pumpkinseed sunfish in the wrong place is a good example of an undesirable fish that can cause extensive damage to trout fishing. They out-compete the trout for food and space, reproduce at an incredible rate and eat small trout fry. The result is a lake filled with lots of little sunfish with minimal fishing value.

Pumpkinseed sunfish and other undesirable species such as carp are introduced into good trout waters in a variety of ways. In some lakes, the fish enter naturally from upstream or downstream. In others, they are introduced by fishermen using live fish for bait (which is why it is illegal to fish with live fish in Washington), and by people who think that they are helping improve the fishing in the lake by giving mother nature a boost by planting their favorite fish.

Lake management is much like good farming. A smart farmer knows which crops will do best in his area, and a good fish biologist knows which fish species will give the best production in a lake. And, just as a farmer tries to eliminate weeds, which are nothing more than undesirable plant species, a fish biologist works to rid lakes of undesirable fish.

# LAKE REHABILITATION

## DESIRABLE VS UNDESIRABLE FISH

What do fish biologists mean when they say a fish species is "desirable" or "undesirable"? Just as people's tastes in clothing, food and sport change over time, so does the definition of desirable fish species. Generally, an undesirable species is one that is unwanted, like a weed, and therefore unused; or more often, a species that makes it difficult or impossible to produce a healthy population of a more preferred fish. Carp and squawfish are almost always considered undesirable in Washington, as are chubs, tench and excessive populations of shiners, sticklebacks, dace and roach.

Under certain circumstances any fish could be undesirable: an overabundance of stunted brook trout or four-to-five inch adult crappie, or even an adult population of bass that fails to grow to a size that attracts fishermen.

## HOW

To return lakes to a high quality, highly productive fishery WDW has a fish management program known as "Lake Rehabilitation." In simplistic terms, a rehabilitated

body of water is one where the existing fish populations are eliminated, and a more desirable population is introduced.

In the early years, lake rehabilitation efforts were aimed solely at maintaining quality trout waters. But in recent years, the tastes of the fishing public have turned toward bass and other sunfish, in addition to trout. Consequently WDW is using rotenone as a tool to improve warm-water fish populations as well.

But the majority of rehabilitations are for trout waters. Fewer than 5% of Washington's lakes are managed as trout-only waters. To maintain a quality trout fishery requires a high survival of planted fingerling-sized trout. Survival of the fingerlings depends upon many things, the most important being the absence of other fish that eat small trout, or compete with them for food and space. It is crucial to keep trout-only waters free of fish such as sunfish, catfish, perch, crappie and bass.

The tool used most frequently to eliminate existing fish populations is rotenone. In the late 1930's fish biologists tested this chemical (found in the roots of a tropical plant, and used for centuries by natives of South America and Asia to catch fish for food) and found it to be a safe, effective and eco-

nomical way to rid a body of water of undesirable fish.

Rotenone works by blocking metabolism at the cellular level. In the concentrations used by fisheries managers (usually one pound per two million pounds of water), it is not harmful to mammals, birds or other animals without gills. No record exists of the chemical ever having caused human illness as a result of its use for rehabilitation. In fact, rotenone is used to cure worms in animals and humans, and is one of the safest and most widely used insecticides in the country.

Rotenone does not harm plants or nearby ecosystems, and it breaks down quickly. It usually dissipates within 30 days, so a lake can be replanted with fish within a short time.

The chemical has some drawbacks. Different species of fish have differing tolerances to it, as do different individuals of the same species. Putting rotenone into a lake does not always kill all the fish in it; it is sometimes ineffective in lakes with large amounts of organic matter and it may fail to reach the deepest parts or areas near springs, marshes, dense weed beds and inlet and outlet streams.

On the average, rehabilitated lakes must be treated with rotenone every eight years to

# LAKE REHABILITATION

maintain high production. Incomplete kills and the re-introduction of undesirable fish are the main reasons necessitating continued rehabilitation.

## COSTS

Rotenone is relatively inexpensive to use. In 1984, WDW's fish management division spent two percent of its budget for materials for lake rehabilitation. Based on 1984 prices, it cost the department only about \$50 per acre of water treated.

Without chemical treatment, WDW could not furnish the high quality fishing we now enjoy, even if we had unlimited funds. If we tried to maintain this quality of fishing by hatchery production alone, we would have to build far more hatcheries at tremendous cost. This is why:

- Small trout (100-200 fish per pound) planted in trout-only lakes yield returns as high as 80% in some eastern Washington lakes, with 50-60% returns common. Costs: \$.03 per fish produced, \$.06 per fish in the creel.

- Similar plants in western Washington also produce high returns, although the absence of a protective ice covering in the winter increases the losses to birds and other predators.

- Plants of small trout in lakes with established populations of other species are usually much less successful. Not only do these other species prey upon the trout fry, they also compete with them for food.

- Providing trout fishing in mixed-species waters can be done by planting legal-sized trout. Seven-inch trout cost

about 40 cents each to raise, with returns to the fishermen of 30-50%. Costs: \$.80 to \$1.30 per fish in the creel.

(Although survival of trout fry in most mixed-species waters is extremely low, there are some rare exceptions of trout fry survival of up to 25 percent. Conditions leading to this higher rate of survival are not completely understood, but ongoing research studies by WDW biologists may lead to new ways to provide mixed-species lakes with good spiny-ray fishing and cost-effective trout angling as well.)

The chart on the following page shows how much it would cost to manage a lake (in this case, Lake Erie in Skagit County), for the same number of trout available to anglers, with and without rehabilitation. (These figures assume that rehabilitation would be necessary every eight years, which is the statewide average.)

Catch records show that rehabilitated lakes produce over two-and-a-half times as many trout as multiple-species lakes stocked with catchable-sized trout, and that fish planted as fry are usually larger when caught than those planted as catchables. This is because all of the rehabilitated lake's productive capacities are channeled directly into efficient,



# LAKE REHABILITATION

well-adapted species that are popular with fishermen. "Trout-only" lakes combine the most economical and the best biological aspects of fisheries management.

## WHERE

Are fish biologists "poisoning out all the lakes" as some people fear? There are over 4800 lakes and reservoirs in Washington below 2500 feet in elevation. Since the start of the rehabilitation program, the WDW has treated fewer than 450 of these, with a total of about 33,000 surface acres. Included in this figure are those lakes treated more than once, so the rehabilitation program has touched only a small portion of the state's waters.

The WDW's rehabilitation



## MANAGEMENT COSTS FOR MAXIMUM TROUT CATCH

	with rehab	without rehab catchables-only	fry and catchables
rotenone	\$1200 (2000 lbs.)	0	0
catchable trout	\$10,000 (25,000 fish @ 5/lb) 1st year only	\$80,000 (25,000 fish @ 5/lb) each year	\$70,400 (22,500 fish @ 5/lb) each year
fry trout	\$5320 \$665 (50,000 fry @ 150/lb) each year	0	\$5320 \$665 (50,000 fry @ 150/lb) each year
TOTAL	\$16,520	\$80,000	\$75,720

program is one of maintenance, rather than one of expansion. The most adaptable waters have already been treated; and there is little room for expansion of existing hatchery production. The program is intended to keep the existing rehabilitated lakes at maximum production. There are approximately 250 lakes (5%) that are on a regular treatment schedule, with a treatment approximately every eight years.

## PUBLIC INPUT

When a lake rehabilitation is considered, WDW takes pains to see that the public is informed and actively solicits comments from interested persons. Environmental impact statements are filed; shoreline residents are told of the proposal and polled for their input; and public hearings are held on controversial rehabs.

The Washington Wildlife Commission has been given specific authority by the legislature to authorize lake rehabilitations. The public involvement process culminates with public testimony at Commission hearings before final decisions are made. The entire process is intended to educate the public about the reasons for lake rehabilitations, and to involve affected citizens in the decision making process.

The Washington Department of Wildlife will provide equal opportunities to all potential and existing employees without regard to race, creed, color, sex, sexual orientation, religion, age, marital status, national origin, disability, or Vietnam Era Veteran's status.

The department receives Federal Aid for fish and wildlife restoration. The department is subject to Title VI of the Civil Rights Act of 1964 and Section 504 of the Rehabilitation Act of 1973, which prohibits discrimination on the basis of race, color, national origin or handicap. If you believe you have been discriminated against in any department program, activity, or facility, or if you want further information about Title VI or Section 504, write to: Office of Equal Opportunity, U.S. Department of Interior, Washington, D.C. 20240, or Washington Department of Wildlife, 600 N. Capitol Way, Olympia, WA 98504.